PROVISIONAL INTELLIGENCE REPORT

THE SHIPBUILDING INDUSTRY OF POLAND

CIA/RR PR-83
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CENTRAL INTELLIGENCE AGENCY

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CIA/RR PR-83

(ORR Project 35.241)

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FOREWORD

This report discusses the four major shipyards of Poland. Under the administrative reorganization of 1 January 1953, these yards were placed under the control of the Ministry of Machine Industry, which controls the production of all major merchant vessels constructed in Poland. Other Polish shipyards are under the Ministry of Shipping, which controls the production of small river craft and fishing craft and the repair of vessels.

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THE SHIPBUILDING INDUSTRY OF POLAND*

Summary

The shipbuilding industry of Poland is centered in four major shipyards. These four shipyards, all engaged in the construction of merchant vessels, have completed less than half the planned construction assigned to the yards under the revised (1952) Polish Six Year Plan. Approximately 37,500 DWT (deadweight tons)** of merchant vessels were constructed in these shipyards in 1952 and about 51,600 DWT in 1953. It is estimated that about 98,900 DWT will be constructed in 1955. Planned construction in 1953 was 117,000 DWT, and the 1955 plan has scheduled the construction of 150,000 DWT of merchant vessels.

It was initially agreed with the USSR that Poland should keep about one-half the vessels produced under the Six Year Plan (1950-55). In fact, about 4 out of 5 of the vessels produced to date have been exported to the USSR. Even so large a share of total construction, however, probably will amount to only two-thirds of the tonnage assigned to the USSR under the initial agreement, since production has fallen so far short of the goals of the original Plan. By the same token, Poland's share probably will amount to about one-sixth of the tonnage originally assigned to it.

Planned production ranges in type from merchant vessels, from the size of Liberty vessels to small coasters, to fishing trawlers. No evidence of the construction of naval vessels exists, although small naval craft may possibly be under construction.

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 August 1954.
** Deadweight tonnage is defined as the cargo-carrying capacity plus the weight of passengers, fuel, water, stores, dunnage, and such other items as are necessary for use on a voyage, all expressed in long tons. It is the difference between light displacement and displacement loaded.

Employment in the industry amounted to about 20,600 in January 1953 and rose to about 32,300 in January 1954. Estimated labor productivity of the industry is less than 5 GRT (gross register tons) per man-year, whereas labor productivity in the US during World War II averaged 16.8 GRT per man-year. It is believed that Polish labor productivity will rise, with a consequent rise in the total output of vessels.

The major material requirements of the industry apparently can be adequately supplied from domestic production. Marine engines, however, are not produced in sufficient quantity to meet requirements. Poland imports engines from Western manufacturers and also has been attempting to design marine engines. Poland is expected to be self-sufficient in the production of marine engines with a few years.

I. Introduction.

A. Definition and General Description.

This report considers in detail only those Polish shipyards (stocznie) engaged in the construction of vessels under the Six Year Plan (1950-55). It considers only incidentally other shipyards, including repair shipyards and inland shipyards, whose limited production does not fall within the scope of the Six Year Plan, and the production of components as it relates to ship construction.

The four largest shipyards in Poland are engaged in the construction of new vessels. The largest of these shipyards is Stocznia Gdanska, followed in decreasing order of size by Stocznia Szczecinska, Stocznia imienia Komuny Paryskiej, and Stocznia Polnocna. 1/* The shipyards are located in the three principal sea ports of Poland: the first in Gdansk; the second in Stettin (Szczecin); the third in Gydnia; and the fourth also in Gdansk, all of which are open to the Baltic.

B. History.

Poland did not have a tradition of shipbuilding before World War II, and only one of the major shipyards, Stocznia imienia Komuny

* Footnote references in arabic numerals are to sources listed in Appendix E.

Paryskiej, in Gydnia, was formerly Polish-owned. 2/ All other shipyards were formerly German-owned. These same shipyards, which are now building vessels for Poland, were contributing to the German war effort during World War II. Shipyard facilities in the Stettin area suffered war damage, but the other areas were more or less undamaged when the Russians occupied the territory left by the Germans. The Russians began a systematic program of dismantling shipyard facilities, which were carried to the USSR. When this program was completed, the shipyards were turned over to the Poles. Poland received Stocznia Polnocna, 3/ in Gdansk, and Stocznia Gdanska, 4/ in Gdansk, in 1945; probably received Stocznia imienia Komuny Paryskiej in 1946; and received Stocznia Szczecinska, in Stettin, in 1947. 5/ Construction of vessels in these yards followed about the same order: Stocznia Polnocna began construction in the fall of 1946, Stocznia Gdanska at the beginning of 1948, Stocznia imienia Komuny Paryskiej during the fall of 1951, and Stocznia Szczecinska at the beginning of 1951.

C. Importance.

The Polish shipbuilding industry is becoming an increasingly important contributor of seagoing and fishing vessels to the merchant fleet of the USSR. To date, practically all production has gone to the USSR. The few vessels which have been built and put into the Polish merchant marine are the smaller vessels and the ones which, in general, represented the first vessels in a class. The shipbuilding industry in 1953 consumed about 1.3 percent of the Polish labor force.

D. Organization.

A reorganization of the Polish shipbuilding industry which took effect on 1 January 1953 separated shipyards for new construction from ship repair yards on an administrative basis. The shipyards for new construction, the four major yards in Poland, were placed under the Ministry of Machine Industry; all other yards were placed under the Ministry of Shipping. 6/ Figure 1* shows the organizational structure of the two ministries. 7/

* Following p. 4.

II. Production.

A. Six Year Plan for Shipbuilding.

The original Six Year Plan called for the construction of 241 vessels totaling 620,030 DWT, of which tonnage 46 percent was to be built for Polish use and 54 percent for the USSR. Construction was to take place as follows: Stocznia Gdanska, 456,300 DWT; Stocznia Szczecinska, 140,800 DWT; Stocznia imienia Komuny Paryskiej, 20,500 DWT; and Stocznia Polnocna, 2,430 DWT. Some of the vessels included in the Plan were constructed. The Plan was revised for the last half of the period (1952-55), however, changing the number and types of vessels to be constructed. 8/

The modified Plan for 1952-55 calls for the construction of 216 vessels of 7 types (merchant and fishing) totaling 474,940 DWT. This modified plan can be substantiated by the numerous reports of vessels being built or completed. Table 1* shows the modified Plan for the constructing shipyards. 9/

B. Estimated Production.

In 1948, construction began on types of vessels specified under the Six Year Plan, with output increasing year by year. Whereas in 1948 a total of 6,500 GRT was completed, in 1953 42,000 GRT were completed. The plan for 1953 was only fulfilled by 44 percent, and unless production increases in 1954 and 1955, the modified 6-year shipbuilding plan will not be fulfilled. The bulk of Polish production has gone to the USSR. Poland has received to date only 13 merchant vessels, totaling about 22,000 GRT; 3 super trawlers; and a large number of small fishing vessels. Table 2** shows the estimated production by yard from 1949 through 1957 in GRT.

Stocznia Gdanska is the major producing yard. Not only has this yard been turning out a number of different types of vessels, but it is the only shipyard in Poland to turn out large merchant vessels. The other yards are specializing in other vessel types: Stocznia Szczecinska, medium-sized colliers; Stocznia imienia Komuny Paryskiej, small Baltic coasters; and Stocznia Polnocna, fishing trawlers.

* Table 1 follows on p. 5.
** Table 2 follows on p. 6.

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FIGURE 1

MINISTERIAL ORGANIZATION OF THE SHIPBUILDING INDUSTRY OF POLAND

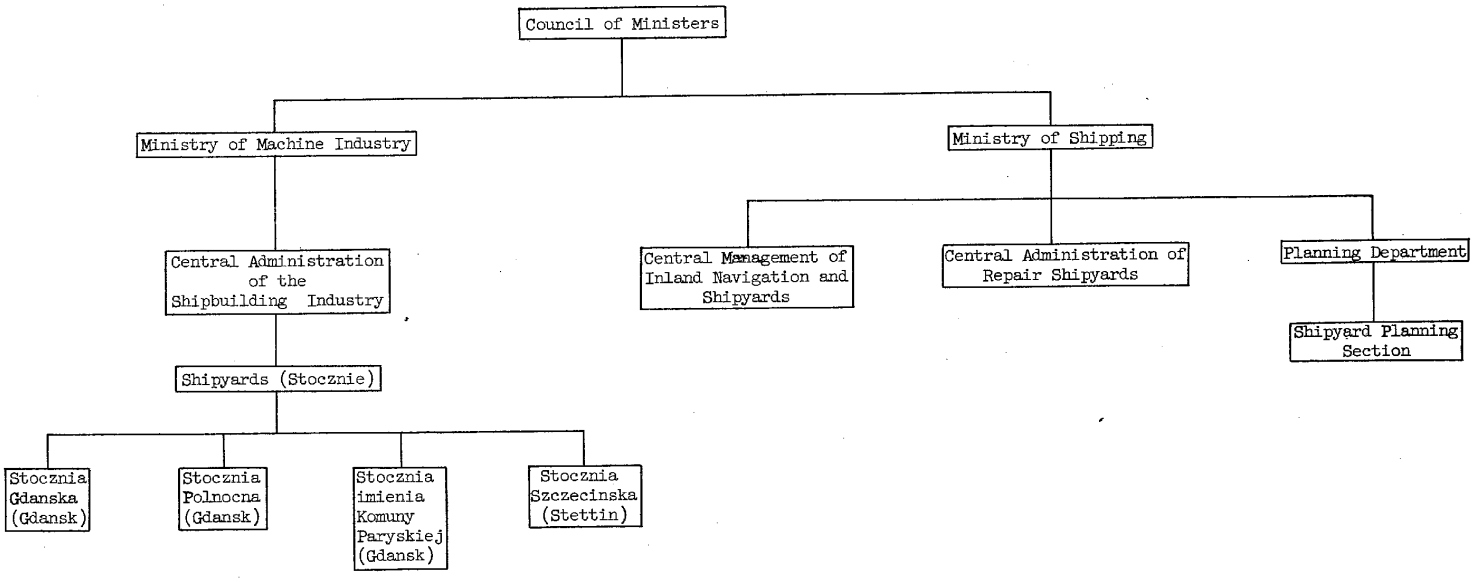

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Table 1

Modified Plan for the Construction of Vessels in Polish Shipyards
1952-55

DWT

Shipyard	1952	1953	1954	1955	Total	Percent
Stocznia Gdanska	43,180	80,670	100,670	103,740	328,260	69
Stocznia Szczecinska	15,200	30,400	38,000	38,000	121,600	26
Stocznia imienia Komuny Paryskiej	3,280	4,920	4,920	6,560	19,680	4
Stocznia Polnocna	1,080	1,350	1,350	1,620	5,400	1
Total Planned Construction	62,740	117,340	144,940	149,920	474,940	100
Total Estimated Construction a/	37,567	51,612	99,530	98,940	287,649	
Percentage of Plan Completion	60	44	69	66		

a. Totals obtained from Table 2 by conversion of GRT to DWT.

III. Input Requirements.

A. Materials.

The material requirements of the shipbuilding industry of Poland in 1953 are small in relation to total national production. The principal material requirements are fulfilled by indigenous production. Small quantities of aluminum, tin, cobalt, columbium, molybdenum, and vanadium must be imported. Increased production, through increases in the labor force and increases in efficiency, will in future years boost the quantities of materials used. Table 3* shows the estimated total input requirements in 1953 and the inputs required by the individual shipyards, based upon the number of ships completed within each yard during 1953.

B. Power.

The electric power requirements of the shipbuilding industry of Poland for 1953 are shown in Table 3.

* Table 3 follows on p. 6.

Table 2

Estimated Construction of Vessels in the Polish Shipbuilding Industry
1949-57 a/

GRT

Yard	1949	1950	1951	1952	1953	1954	1955	1956	1957
Stocznia Gdanska	11,049	12,357	12,805	27,604	32,439	58,032	50,264	60,000	65,000
Stocznia Szczecinska	0	b/	1,092	1,570	4,305	12,510	17,980	18,000	20,000
Stocznia imienia Komuny Paryskiej	0	0	0	1,348	2,505	6,066	8,088	8,000	8,000
Stocznia Polnocna	1,385	1,592	2,220	2,127	2,983	3,409	2,796	3,400	3,400
Total GRT	12,434	13,949	16,117	32,649	42,232	80,017	79,128	89,400	96,400

a. Figures are for vessels completed, and do not represent vessels in various stages of construction; compiled from production tables of the individual shipyards.
b. Oliva, 2,900 GRT, completed from hull left by Germans.

Table 3

Input Requirements for the Polish Shipbuilding Industry
1953

Shipyard	Total Steel (Long Tons)	Alloy Steel (Long Tons)	Chromium (Pounds)	Manganese (Long Tons)	Molybdenum (Pounds)	Nickel (Pounds)	Vanadium (Pounds)	Copper and Base Alloys (Thousand Pounds)	Aluminum (Pounds)	Lead (Thousand Pounds)	Tin (Pounds)	Zinc (Thousand Pounds)	Cobalt (Pounds)	Columbium (Pounds)	Rubber (Pounds)	Lumber (Board Feet)	KWH (Thousand)	Coal (Long Tons)	Coke (Long Tons)
Stocznia Gdanska	26,000	481	4,525	150.8	2,586	53,332	281	832	10,400	474	39,000	169	57	13	73,060	2,406,350	20,800	6,500	650
Stocznia Szczecinska	3,900	72	679	22.6	390	8,002	43	124	1,560	71	5,850	25	9	2	10,959	405,570	3,120	975	98
Stocznia imienia Komuny Paryskiej	2,700	50	470	15.7	269	5,540	29	86	1,080	49	4,050	18	6	1	7,587	232,200	2,160	675	67
Stocznia Polnocna	3,760	70	654	21.8	375	7,715	43	120	1,500	68	5,640	24	8	2	10,566	461,910	3,008	940	94
Total	36,360	673	6,328	210.9	3,620	74,589	396	1,162	14,450	662	54,540	236	80	18	102,172	3,506,030	29,088	9,090	909
Percent of National Production	1.3	0.6	a/	a/	Import	a/	a/	a/	Import	a/	Import	a/	Import	Import		0.2	0.2	a/	a/

a. Negligible.

C. Manpower.

In 1953 the Polish shipbuilding industry employed approximately 1 percent of the total Polish labor force. Planned labor employment for 1947-49 under the Association of Polish Shipyards, which is believed to include inland shipyards as well as the shipyards which later came under the Ministry of Machine Industry, was 7,900 in 1947, 8,000 in 1948, and 9,700 in 1949. 10/ The estimated employment in the Polish shipbuilding industry from 1946 and extended through 1957 is shown in Table 4.* Although the estimated employment figures for the period 1947-49 are lower than Plan figures, it is believed that this difference is due in part to the larger number of shipyards included under the Plan. Under the Plan, 1949 was to have shown a 112-percent increase over 1947, but the estimated employment for the period showed an increase of 140 percent.

The industry was formed around a nucleus of German shipyard workers, 11/ who were supplemented by Poles. As the shipyards were placed in operation, training schools were established to train unskilled workmen as shipyard workers. In Stocznia Gdanska the German element was eventually supplanted, 12/ whereas in Stocznia Szczecinska a recruitment program for skilled German workmen was conducted. 13/ The Germans are still employed at the latter yard.

When the Polish shipyards began the construction of vessels for the USSR, Soviet personnel apparently were placed in the shipyards to supervise all construction. This situation was reported in 3 out of the 4 shipyards.

Productive workers are estimated to make up 71.3 percent of the total employment of the shipyards. Labor productivity for the productive workers is probably less than 5 GRT per man-year, although adequate data for the determination of productivity are lacking. Compared with an average productivity rate of 16.8 GRT per man-year in the US during World War II, Poland's productivity is low. 14/

D. Transportation.

It is estimated that approximately 14 million ton-miles of transportation were needed to support the Polish shipbuilding industry in 1953. Rail transport accounts for the major share of the goods movement. 15/

* Table 4 follows on p. 8.

Table 4

Estimated Employment in the Polish Shipbuilding Industry
1946-57 a/

Number of Employees

Shipyard	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Stocznia Gdanska	2,200	3,600	3,350	4,250	4,800	5,300	7,700	12,000	23,000	28,000	31,000	33,000
Stocznia Szczecinska	0	450	500	700	1,100	1,800	2,950	3,400	3,700	4,000	4,200	4,350
Stocznia imienia Komuny Paryskiej	0	200	400	800	1,350	1,950	2,500	2,900	3,100	3,250	3,300	3,400
Stocznia Polnocna	500	750	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,800	3,100	3,300
Total	2,700	5,000	5,250	7,000	8,750	10,800	15,150	20,550	32,300	38,050	41,600	44,050

a. As of 1 January. For method of compilation of employment figures, see Methodology, Appendix C.

IV. Distribution.

A. Domestic Requirements.

The Polish merchant marine is composed of a variety of vessels of all ages, many of which were acquired by purchase from the West. Poland could adequately supply domestic requirements by the construction of vessels in Polish shipyards if production for the USSR were decreased. At present the only vessels which Poland has built for itself are those laid down early in the shipbuilding program.

B. Imports and Exports.

In 1953, Poland imported only one vessel, the Wspolpraca (6,175 GRT). In the same year, Poland exported 27,750 GRT of merchant vessels and 4,904 GRT of fishing vessels* for a total of 32,654 GRT, or almost all of its new construction.

C. Merchant Fleet.

The merchant fleet of Poland as of 1 January 1954 consisted of 70 vessels of 1,000 GRT and over, totaling 274,091 GRT. 16/ It does not appear that the size of the fleet will be increased by construction in Polish shipyards, nor does it appear that any vessels will be retired because of age. The most probable changes, therefore, will occur through maritime losses or through purchases in the West.

V. Vulnerabilities and Intentions.

A. Vulnerabilities.

Poland can supply the principal materials needed in ship construction by domestic production. The industry is not self-sufficient in marine propulsion units, but the attention devoted to this problem will probably enable Poland to reach some degree of self-sufficiency in the next few years. At the present time, Poland is producing sufficient reciprocating engines to take care of the production of Soldek-class vessels, and has produced one engine for the first vessel of the Kolno class. A recent report 17/ indicates that a new steam engine has been developed for the

* This figure does not include fishing vessels smaller in size than super trawlers.

Donbas class. This may be an engine similar to that which is used in the Kolno class. It is also reported that considerable work is under way to develop a diesel engine of about 5,000 horsepower. 18/ All these indications point to an attempt to attain self-sufficiency, and there is no reason to believe that given sufficient time this goal will not be reached. Economic controls will therefore have less effect on production in the future.

B. Intentions.

The Six Year Plan is an ambitious program for a nation new to the shipbuilding field. In spite of the inherent difficulties encountered in establishing a shipbuilding industry, however, Poland has been turning out numbers of vessels, and it appears that these numbers will substantially increase in the future. If further plans are forthcoming, they will in all probability call for increased production, the net result being that Poland could become an important shipbuilding center.

The bulk of Polish production is exported to the USSR, and it can be assumed that the vessel types being constructed are designed to fit Soviet needs. If this assumption is true, then future shipbuilding plans should reflect future needs or desires of the USSR.

APPENDIX A

GENERAL DESCRIPTION OF THE SHIPBUILDING INDUSTRY

I. Scope of the Shipbuilding Industry.

The shipbuilding industry includes the construction and repair of all waterborne vehicles and the production of components. The study of the industry also involves an examination of the local plant administration, the national political control, the research and development involved in shipbuilding, and the economic factors that influence the operation of the industry.

A. Design.

The determining factors in the formulation of the general design characteristics of a planned vessel are the services required of the vessel, the size and speed needed to perform those services, the propulsion machinery available, and the type of waters in which the vessel will operate.

To successfully design a vessel with the required characteristics, the naval architect has a large volume of data gleaned from past experience by every branch of the shipbuilding and shipping industries. He also uses the facilities and technical experience of private and governmental research and experimental stations equipped to make model tests of the hull and any or all of the individual parts entering into the vessel. From these data, naval architects and marine engineers develop the final design.

B. Shipbuilding and Repair.

A ship is the largest piece of mobile machinery built. Therefore, unlike most commodities, the production of a ship requires the skills and knowledge of many engineering fields.

The actual building or repair of a vessel takes place in a shipyard having facilities to build or repair the specified type of vessel. The modern large shipyard is a combination of a steel fabrication plant, a mechanical assembly plant, an electrical installation firm, and many other industrial enterprises. The shipyard is not

a manufacturing plant in the true definition of the word but performs a "value added" type of operation usually of the job shop variety. It is at this stage that shipbuilding calls upon the nation's industrial production to fill the many orders for raw, semifinished, and finished material that goes into the building of a vessel. Steel is obtained in the form of plates and shapes which will be cut, formed, and assembled into the required shape for the vessel's hull. Machinery, electrical apparatus, furniture, and many other components are obtained in varying stages of assembly for installation in the vessel's hull.

C. Component Production.

The production of components for the industry is carried on by the normal manufacturers of civilian goods and by special plants producing principally for the shipbuilding industry. This production is vital to the satisfactory completion of a vessel.

D. Inspection and Classification.

During construction of a merchant vessel, inspection and classification is usually accomplished by an independent organization for the purpose of insuring compliance with governmental regulations and insurance standards. The independent classification organizations have set standards for hull and machinery. These classification organizations came into being because of the demands of marine insurance companies and ship operators for standards regulating the design and measurement of vessels. They may be governmental agencies or privately owned firms.

The inspection of naval vessels is accomplished by navy engineers.

E. National Policy.

The dependence on foreign trade to sustain the national economy dictates, in a large measure, the national policy regarding the ownership, operation, construction, and maintenance for the merchant fleet. Capital investment of private or public funds and subsidization of the industry are largely determined by the national policy.

The vulnerability of the nation's military defense through water approaches, the protection of the merchant fleet, and national aspirations dictate the national policy regarding the construction and maintenance of a naval fleet.

II. Shipyards.

A. Definition of Ship Construction and Repair.

Merchant vessel construction and repair involves the construction or repair of all sizes of vessels employed in the movement of cargo and/or passengers. This work includes such vessels as passenger ships, tankers, dry cargo vessels, fishing vessels, tug boats, dredges, and barges.

Naval vessel construction and repair involves the construction or repair of all sizes of warships, naval auxiliary vessels, troop support craft (either for naval or army units), hydrographic vessels, and the like.

B. Classification of Shipyards.

Shipyards generally are divided into two classes.

1. Coastal shipyards build and/or repair vessels for ocean navigation. These yards may be located many miles from the open sea, such location being dependent upon a sufficient depth and width of channel to permit ready access to the sea.

2. Inland shipyards build and/or repair vessels for operation upon inland waterways.

C. Ship Construction Procedures.

The basic shipyard is purely a steel erection and assembly plant where steel plates, shapes, and bars are cut and shaped, and assembled into the required hull form. The outfitting (installation of machinery, deck equipment, furniture, and the like) may be carried on at this basic yard or at some other installation.

The method of constructing a vessel varies from one yard to another, but general descriptions can be given as follows:

1. Standard construction procedure involves the building of a vessel from the keel up by erecting individual items or small subassemblies in proper sequence. A great part of the hull may be in place before any one section is completed.

2. The prefabrication procedure involves the building of a vessel by the erection of subassemblies which have been prefabricated at some point other than on the shipbuilding ways. This procedure is generally divided into two separate and distinct practices. The first and most common practice is the erection on or near the shipbuilding ways of subassemblies, none of which, however, form a completed transverse section of the hull. These subassemblies usually are lifted into place on the building ways. The second practice, common in some yards building small vessels, is the so-called sectional method. This method involves the joining together on the building ways of completed transverse hull sections. These completed sections usually are not lifted into place but are moved on mobile cradles or skids to the ways where the several sections are joined together.

3. Serial construction (production line method) involves the construction of a number of vessels of the same type by use of the prefabrication procedure with operations repeated at scheduled intervals.

D. Description of Shipyards by Types.

1. Naval Shipyards.

Naval yards are operated by the governmental department concerned with the construction, repair, and operation of naval vessels. These yards generally have more facilities than a commercial yard because of the type of work handled on repairs and for operational purposes of the fleet. Leaving out these special purpose facilities, the naval shipyard is similar to the large commercial shipyards.

The naval yard generally constructs vessels by the standard or prefabrication procedure employing the subassembly method. Generally the vessels are completely outfitted and made ready for sea service within the yard.

2. Coastal Shipyards.

Coastal shipyards construct vessels for ocean transportation, coastal vessels, fishing vessels, and tugs. Depending upon the extent of the facilities, the yards generally specialize in certain sizes and types of vessels. The larger yards are complex plants covering a wide range of trades.

The method of constructing vessels is generally by the standard construction procedure or prefabrication procedure. Some of the smaller yards use the serial production method when the quantity of similar vessels to be built warrants the setting up of such facilities.

Only when these yards are emergency or temporary shipyards are the facilities at a bare minimum to perform the construction of certain vessels.

Repair work is carried on simultaneously with construction at some of these yards. The larger yards have floating drydocks and/or graving docks while the smaller installations have marine railways and/or floating drydocks for repair work.

3. Inland Shipyards.

Inland shipyards can be of the simplest form of a shipyard, even to the extent that there are no permanent building ways. Here, again, the type of work handled determines the extent and magnitude of facilities. Such yards construct barges, river towboats, tug boats, miscellaneous commercial craft for special operations, and the like.

The smaller inland yards usually construct vessels by the standard construction procedure. As the volume of work increases, the construction procedure changes into the prefabricated subassembly and the sectional method. Inland craft is ideally suited for the sectional method of construction, especially in case of serial production. Very often vessels are constructed on marine railways or adjacent to the marine railway and launched by such means.

Most of the inland shipyards handle repair work to varying degrees. The yards that have drydocking facilities such as marine railways or floating docks handle the complete repairs and others without such facilities do topside and machinery repairs.

4. Ship Repair Yards.

Certain shipyards specialize only in vessel repairs. The facilities of such yards are selected and laid out primarily to accommodate vessels to be repaired. Drydocking facilities consist of marine railways and floating and graving drydocks. Equipment for handling steel fabrication is limited, but the machine shops are well equipped. This type of yard, while being strictly a repair yard, will also fall within one of the types listed above.

E. Shipyard Facilities.

1. Shops.

The principal shops located in a shipyard vary over a wide range depending upon the size and type of vessels built or repaired and the need for a self-supporting facility. Depending upon the size of the shipyard, the shops will include the following special installations, either in separate buildings or combined in one or more buildings:

a. Mold loft, where plants are laid down full size by the loftsman from the blueprints for purposes of making templates (patterns) for use of the steel trades.

b. Plate shop, where steel plates are cut, beveled, punched, and shaped by layer-out and shipfitter. This shop is sometimes referred to as a boiler shop.

c. Angle shop, where steel shapes are formed into the curvature of the hull by anglesmiths. This involves heating the steel shape and bending it to the determined shape on bending slabs.

d. Fabrication shop or structural shop, where steel plates and shapes are joined together to form subassemblies of varying sizes, depending on the crane facilities and method of construction.

e. Rigging loft, where ships' rigging is made by riggers.

The titles of other shops are self-explanatory, such as carpenter shop, machine shop, foundry, forge, pipe shop, and paint shop.

2. Special Facilities.

Certain other facilities are entirely peculiar to a shipyard and will not be found elsewhere. These facilities are the actual building ways and drydocking facilities, with installations as follows:

a. The building ways, longitudinal, refers to the space where a vessel is constructed and includes the ground or stationary ways and the sliding ways. They slope gently down toward the water with sufficient slope to cause the vessel to move under the impulse of gravity when disengaged from the holding appliance. The ways are built perpendicular or at an angle to the shore line and the vessel is launched stern first into the water.

b. The building ways, transverse, are similar to the longitudinal building ways but lie parallel or at an angle to the shore line from which the vessel is launched sideways into the water.

c. The building basin is an excavation in the shore in which vessels are built. In construction and lay-out, it is similar to the graving dock, being provided with dock gates and a pumping plant and differs principally from a graving dock in that the rate of pumping out of the water is much slower.

d. The graving dock is an excavation in the shore, enclosed by walls and a floor which usually are of concrete or stone construction. Ships in need of cleaning or repair are floated in and then the water pumped out, leaving the vessel resting on blocks. The entrance is closed by some form of gates, either floating, swinging, or sliding. This type of dock may be used for the construction of vessels.

e. The marine railway includes a track, cradle, and winch used to draw a ship out of the water and onto the bank for inspection and repair. The track extends far enough into the water for the cradle to pass beneath the ship. The ship is brought to rest over the cradle, which is then drawn onto the bank. A marine railway may be either for hauling a vessel end ways (longitudinal way) or side ways (transverse way), from the water. The difference is that the transverse railway has more tracks and cradles and generally shorter tracks than the longitudinal railway. They are sometimes utilized for building of vessels.

f. The floating drydock is a U-shaped floating structure of either wood, steel, or concrete, which is fitted with watertight compartments. It is submerged by flooding these compartments and ships enter it while it is submerged. The compartments are then pumped dry, and the dock rises until the ship is completely out of water. These docks are open at either one or both ends, usually the latter.

g. The fitting cut pier (dock or quay) is a pier at which the vessel is moored after launching for the final installation of components and testing. This amount of work may vary over a wide range, depending upon the procedures followed by the individual shipyard. These facilities are also utilized for "above water" or "topside" repairs and machinery repairs.

F. Personnel.

The modern large shipyard requires the services of many people trained and experienced in the fields of business, law, engineering, and numerous industrial trades. Total employees may number from a dozen or so in a small yard to over 15,000 in a large yard. A typical list of the trades involved is:

Anglesmith	Driller	Painter
Blacksmith	Electrician	Passer
Boilermaker	Erector	Pipe coverer
Bolter and reamer	Fitter	Pipe fitter
Brazer	Furnaceman	Press operator
Burner	Grinder	Puncher
Caulker and chipper	Insulator	Rigger
Designer	Joiner	Riveter
Draftsman	Layer-out	Sheetmetal worker
Carpenter	Loftsman	Shearman
Coppersmith	Machinist-outside	Shipfitter
		Welder

Also employed on production are laborers, helpers, apprentices, and the like. The nonproductive trades include maintenance men, storekeepers, truck drivers, crane operators, and the like.

III. Ship Component Production.

A. Scope of Work.

A standard merchant vessel requires approximately 7,000 different items, including such standard items as curtains, medical supplies, and kitchen equipment, and such specialized items as marine engines, anchors, booms, and compasses.

B. Commercial Components.

The standard goods flowing into a shipyard are about as varied as the equipment needed to supply any small community but represent only a small percentage of this type of goods produced by a manufacturer.

C. Marine Components.

Components that are classed as specialized marine items for ships fall into two categories, that is, standard marine parts and items specially designed for the operation required on the vessel on which they are to be used. Such design work is started as soon as the naval architect has reached the stage in the hull design and calculations where he can supply the marine engineers with the necessary specifications.

D. Component Producers.

Components generally are produced by a nation's own industrial plants. Some of the larger shipyards have auxiliary shops capable of building specially designed marine parts. In small countries, however, it may be necessary to import many vital components without which vessels could not be completed.

APPENDIX B

CHARACTERISTICS OF VESSELS CONSTRUCTED UNDER THE POLISH SIX YEAR PLAN

1. General Motor Cargo Vessels.

Construction of general motor cargo vessels probably will begin in 1954 at Stocznia Gdanska. The Polish Six Year Plan calls for 13 of these vessels, which were designed for 10,000 DWT, 19/ or about 7,000 GRT. Diesel engines of 8,000 horsepower have been contracted for with the Fiat Company in Italy. These are Fiat 680 D type, 2-stroke, double-action engines. 20/ The fourth of 7 engines ordered was delivered in August 1953. 21/ Poland is reported to be working on the production of a Sulzer engine of 5,400 horsepower from designs of a 3,800- to 4,100-horsepower engine purchased for this use. If such engines can be built in Poland, the plan is to use 2 engines in the 10,000-DWT general cargo vessels. 22/ It is believed that less than half of the vessels scheduled to be built will be actually finished by the end of 1955.

2. General Cargo Vessel of the "Tramp," or Donbass, Type.

General cargo vessels of the "Tramp," or Donbass, type are being constructed at Stocznia Gdanska under a hull designation of B/31 or 13100. The keel of the first vessel of the class was laid down in 1950. Under the Six Year Plan, 24 vessels are to be constructed with the following characteristics: 5,000 DWT, 3,816 to 3,858 GRT, over-all length of 345.2 feet, and 47.9-foot beam. The vessel uses a steam reciprocating engine coupled to an exhaust turbine. One source reported that the steam engine was a 2,050-horsepower, Lentz-type engine built at Huta Zgoda and Fabryka Maszyn Ciezkich (Zgoda Smelting Works and Heavy Machinery Plant, Elblag). Another source reported the steam engine to have 1,480 brake horsepower and the exhaust turbine to have 620 brake horsepower, a total of 2,100 brake horsepower. 23/

The following vessels of this class have been constructed to date: Donbass, Kuzbass, Vorkuta, Cheremkhovo, Astrakhan', Kemerovo, Kadiyevka, and Novaya Zemlya. All of these vessels have been turned over to the USSR. See Figure 2* for a photograph of a vessel of this class.

* Following p. 22.

3. Lewant Class.

The Lewant class consists of five vessels laid down at Stocznia Gdanska in 1949 and completed in 1952 and 1954. Only five of these vessels were scheduled under the Six Year Plan, all of which were to be kept by Poland. Upon completion, however, 2 of the vessels were delivered to the USSR and 3 went into the Polish merchant marine. Characteristics of this class are as follows: 24/ GRT, 2,700 (approximate); DWT, 4,000; length, overall (feet), 374.13; length, between perpendiculars (feet), 342.76; beam (feet), 48.22; draft (feet), 20.34; refrigerated space, No. 3 hold. Each vessel is powered by a 3,800-horsepower diesel engine, obtained from Sulzer Brothers of Winterthur, Switzerland, and CRDA, Trieste, for a price of US $1,818,000. The engines are reported to be type 9SD60. 25/ The 3 vessels in use by the Poles were completed at Stocznia Gdanska, but the 2 vessels delivered to the USSR were completed, including engine installation, in Denmark, and the Gdansk was scheduled for completion in Denmark. The following are the vessels of this class:

	GRT
Nowa Huta (ex Warszawa)	2,684
Kopernik (ex Lodz)	2,665
Gdansk	2,668
Stavropol' (ex Gydnia)	2,668
Taganrog (ex Szczecin)	2,792

See Figure 3* for a photograph of the Taganrog.

4. Kolno-Class Colliers.

The Kolno class is being built at Stocznia Szczecinska. The first hull of the class was laid down in 1951, and the vessel was completed in 1953. Little in the way of details on the class is available. The Six Year Plan calls for the construction of 32 such vessels. The original plans set the deadweight tonnage at 3,200, but later plans changed the tonnage to 3,800 DWT. 26/ The engines in the 2 vessels completed to date were reported to be all Polish built. [redacted] Poland, according to Plan, is to get 8 of these vessels, and the USSR is to get 24. 27/ The first vessels completed, the Chulym and the Tom', were delivered to the USSR. 28/

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* Following p. 22.

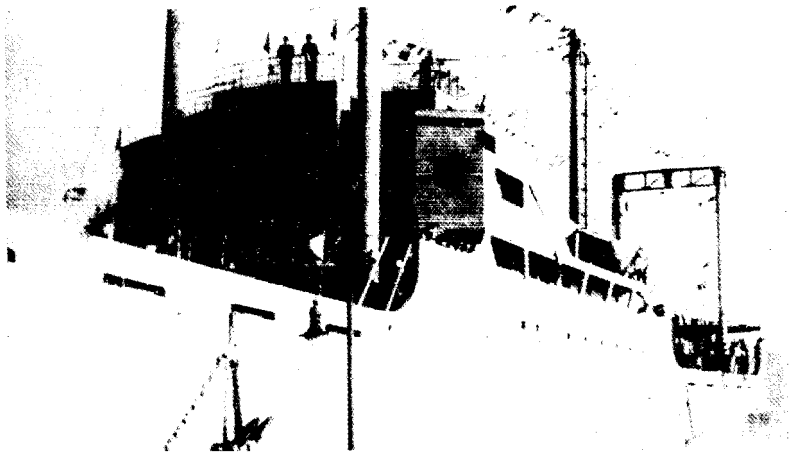

FIGURE 2. General Cargo Vessel of the "Tramp," or Donbass, Class.

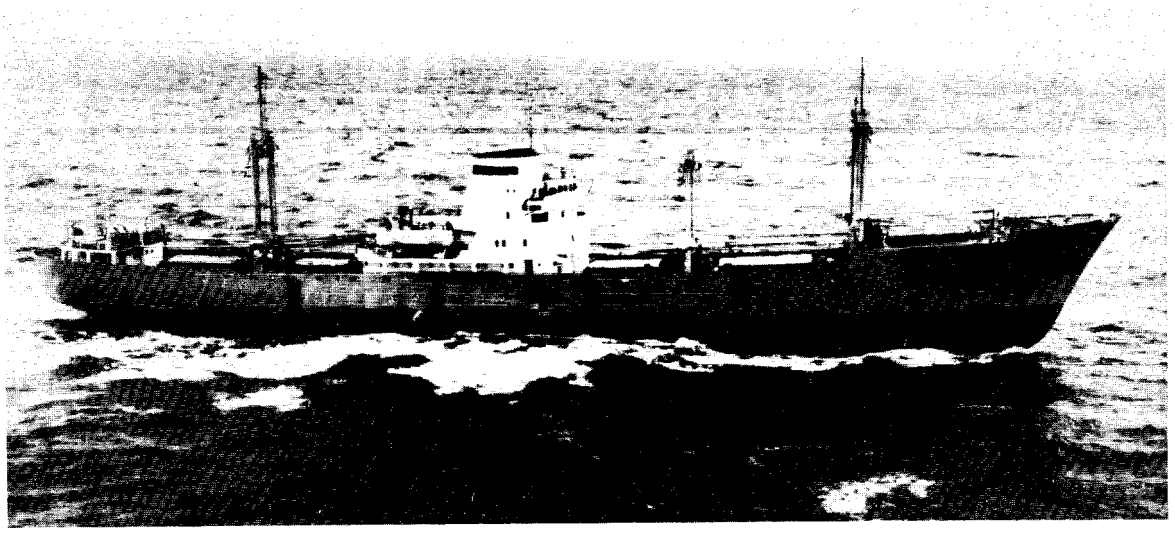

FIGURE 3. Lewant-Class Vessel (the Taganrog).

5. Soldek-Class Colliers.

The Soldek-class vessel has been turned out in greater number than any other type of vessel. The Plan calls for the production of 29 vessels. The first hull was laid down at Stocznia Gdanska in 1948, and construction of this class is continuing. It is believed that the first six vessels, all of which went to Poland, were laid down as the original Soldek class, and that beginning with the seventh hull the class was modified. 29/ All of the modified vessels have gone to the USSR. The

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[redacted]

The original Soldek was a vessel of 2,540 DWT. The following vessels of this class were completed and delivered to the Polish merchant marine:

	GRT
Soldek	2,005
Jednosc Robotnicza	2,003
Brygada Makowskiego	1,946
Marchlewski	1,944
Pstrowski	2,003
Jozef Wieczorek	2,003

The modified vessels of the Soldek class are of 2,620 DWT, with 1,946 to 1,989 GRT. The following vessels of this class have been completed to date and delivered to the USSR:

Pervomaysk	Zlatoust
Zaporozh'ye	Kurgan
Krivoy Rog	Pavlodar
Kramatorsk	Minusinsk
Makeyevka	Nikitovka
Gorlovka	Yenakiyevo
Novoshakhtinsk	Volnovakha
Solikamsk	Novocherkassk
	Tavda

All vessels of the Soldek class have the same general hull characteristics and are propelled by the same type of machinery. They have a length of 280.44 feet, a beam of 40.44 feet, and a depth of 19.02 feet. 30/ They are equipped with coal-burning, reciprocating engines of the Lentz type, built in Poland at Huta Zgoda and Fabryka Maszyn Ciezkich, Elblag. This

type of engine has 1,300 horsepower at 125 rpm. Boilers for the first few vessels were obtained in England, but for subsequent vessels the boilers were reportedly built in Poland. 31/ See Figure 4* for a photograph of the Zlatoust.

6. Baltic Coaster Type of the Bug or Melitopol' Class.

The Baltic coaster type is under construction presently at Stocznia imienia Komuny Paryskiej and is referred to as the Melitopol' class. The Melitopol' is an improved version of the Bug class built by Stocznia Gdanska. The Bug class went into the Polish merchant marine, while the Melitopol' class is going to the USSR. The Plan called for 5 vessels of the Bug class and 24 of the Melitopol' class. The following are the main characteristics of the two classes 32/:

	Bug Class	Melitopol' Class
DWT	660	820
GRT	487	674
Length, over-all (feet)	196.30	196.30
Beam (feet)	31.49	31.49
Depth (loaded, feet)	11.15	11.15

The Bug-class vessels were equipped with a 540-brake horsepower Atlas diesel engine with 350 rpm. The Melitopol'-class vessels were scheduled to have an engine of greater horsepower installed. One report indicated that the engines being used are 700-horsepower German MAG engines. 33/ The vessels of the Bug class completed at Stocznia Gdanska were the Nysa, Dunajec, Odra, San, and Pilica. The following vessels of the Melitopol' class completed at Stocznia imienia Komuny Paryskiej were the Melitopol', Bektash, Tikhvin, Notec, Komuna Paryska, Mingechaur, and Osipenko. The Odra, of the Bug class, was reported to have been built in Gdynia. 34/ See Figure 5* for a photograph of the Pilica.

7. Super Trawlers.

Super trawlers are being built at two yards in Poland, Stocznia Gdanska and Stocznia Polnocna, both in the port of Gdansk. Forty vessels of this type are scheduled under the Six Year Plan. 35/ Three vessels,

* Following p. 24.

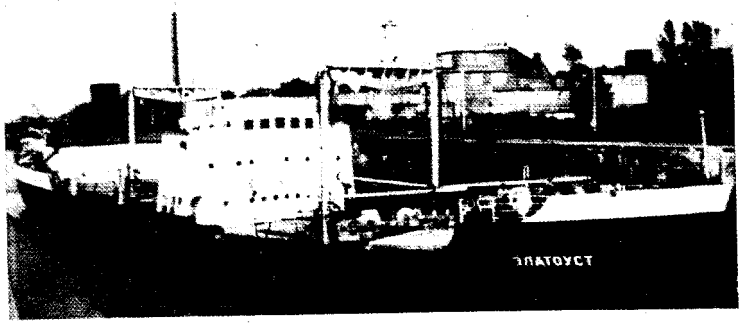

FIGURE 4. Soldek-Class Vessel
(the Zlatoust).

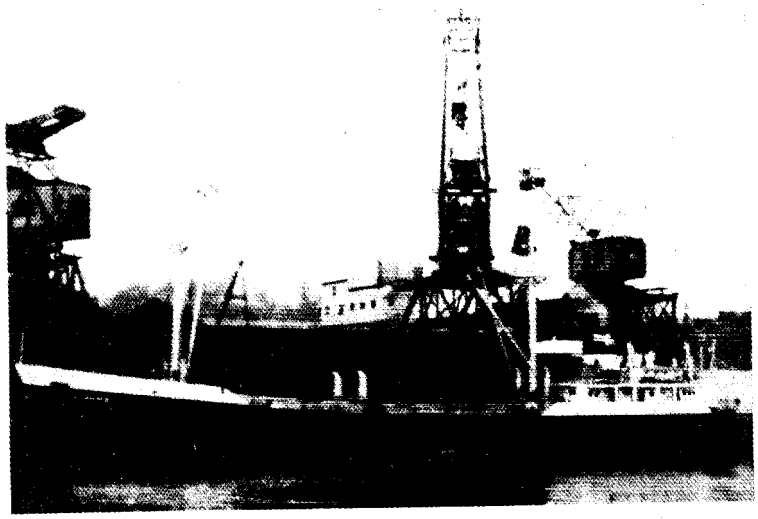

FIGURE 5. Bug-Class Vessel
(the Pilica).

the Rega, the Radunia, and the Rugia, were completed for Poland. All others have apparently been delivered to the USSR and are cometimes referred to as the Lotos class. Vessels of the Lotos class are reported to be shorter than the Rega and the Radunia. Characteristics are available only on the Rega and the Radunia as follows 36/:

DWT	450
GRT	613
Length, over-all (feet)	195.42
Beam (feet)	29.52
Draft (loaded, feet)	16.99

The Rega, the Radunia, and the first two Lotos-class vessels had a reversible compound Stevenson engine developing 715 horsepower at 124 rpm, coupled with a low-pressure Bauer-Wach type exhaust turbine developing 385 horsepower at 6,400 rpm. Subsequent vessels were equipped with Christiansen and Meyer double compound steam engines of 1,100 horsepower and with Howard and Johnson boilers. 37/ [redacted] 25X1B4d4 25X1B4d 25X1B4d

8. Regular, or Kulik, Trawlers.

Regular, or Kulik, trawlers are being built at both Stocznia Szczecinska and Stocznia Polnocna, although it was reported that Stocznia Polnocna would stop this production in favor of small naval craft of similar dimensions. 38/ These trawlers are 90 DWT or 157 GRT and have a length of approximately 110 feet. The Plan calls for 60 such vessels to be constructed. These trawlers are powered by a 300-horsepower diesel engine of June-Munktel or Volunda manufacture (Swedish). 39/ The following are names of Polish trawlers, believed to be of this class, observed in the Baltic:

Bak	Czajka	Dzieciol	Penguin
Bekas	Czapla	Kaczor	Pelikan
Bergeski III	Czubatka	Kania	Sikora
Blotnia	Derkacz	Kassiopea	Slowik
Bialorusja	Drop	Kos	Solva
Bozian	Drozd	Kulik	Sowa
Cietrzew	Dudak	Kwiczol	Skrowronek
Cyranka	Dukek	Ozajka	Werkacz

APPENDIX C

METHODOLOGY

The construction of vessels in Poland, as provided in the Six Year Plan, is limited to four shipyards. The study of the shipbuilding industry, therefore, was confined to a detailed analysis of each of these shipyards. The results of this analysis were then combined into conclusions and estimates for the industry as a whole.

Both the original Plan and the Plan as modified are expressed in terms of vessel types, the number of vessels of each type to be built during each year of the Plan, the DWT of each vessel in a type, and the yard of construction. Plan totals are the result of adding the DWT of individual vessels.

Estimated production was arrived at in a similar manner on the basis of vessel types constructed in each shipyard. These totals are expressed in both DWT and GRT and are the result of the summation of the DWT and GRT of each vessel known or estimated to have been completed. Production in 1956-57 has been determined by assessing the capability of each shipyard to increase production over the 1954-55 estimates.

In the determination of production, a graph was constructed for each shipyard, showing the available building facilities on the vertical axis and time on the horizontal axis. The information from the numerous reports of keels being laid, hulls being launched, and vessels completed was entered on these graphs. Subsequently it was possible to determine building times for the vessel types and to estimate the actual completion date of each vessel.

The input requirements contained in Table 3 are based upon factors derived from US practice contained in CIA files. Polish requirements may possibly vary from the estimates given because of differences in technology and practice or because of substitution for materials which may be in short supply. The factors are as follows: for total steel (long tons), light ship weight*; for alloy steel (long tons), 0.0185 x

* Light ship weight (light displacement) is the actual weight of the ship excluding cargo, passengers, fuel, water, stores, dunnage, and such other items as are necessary for use on a voyage. It is the displacement loaded, expressed in tons, minus the deadweight tonnage.

total steel; for chromium (long tons), 0.0042 x alloy steel; for manganese (long tons), 0.0058 x total steel; for molybdenum (long tons), 0.0024 x alloy steel; for nickel (long tons), 0.0495 x alloy steel; for vanadium (long tons), 0.00026 x alloy steel; for copper and copper base alloys (1,000 pounds), 0.032 x total steel; for aluminum (1,000 pounds), 0.004 x total steel; for lead (1,000 pounds), 0.0182 x total steel; for tin (1,000 pounds), 0.0015 x total steel; for zinc (1,000 pounds), 0.0065 x total steel; for cobalt (pounds), 0.0022 x total steel; for columbium (pounds), 0.0005 x total steel; for rubber (pounds), 2.81 x total steel; for merchant vessel lumber, 86 x total steel; for fishing vessel lumber, 0.39 x GRT; for kilowatt hours, 800 x total steel; and for coal, 0.25 x total steel.

These quantities represent the total requirements for the shipbuilding industry including the shipyard, component plants, and other miscellaneous suppliers of equipment and outfit. Inputs of other basic products, such as coal, coke, and electricity, required to manufacture the raw steel for shipbuilding are not included.

Employment in the shipbuilding industry is the summation of the employment in the individual shipyards. For each shipyard a graph was constructed showing employment on the vertical axis and time on the horizontal axis. All reports of the level of employment are entered on these graphs and a curve constructed through those points believed to indicate employment most accurately.

Transportation requirements are calculated by multiplying the distance from plant to shipyard by the domestic materials required at each shipyard as shown in Table 3. Transportation for the main materials was calculated by this formula; other materials were prorated on the basis of weight relationship.

APPENDIX D

GAPS IN INTELLIGENCE

One of the principal gaps in intelligence on the Polish shipbuilding industry is the lack of detailed information concerning shipyards, particularly facilities and layout drawings of the facilities. Other gaps are the lack of details concerning repair work at the four major shipyards, fishing vessel production, investment, vessel construction, and repair costs.

Very little information is available concerning the shipyards under the Ministry of Navigation, component production, and component plant facilities.

The difficulty in separating ship construction, ship repair, and other production at the individual shipyards tends to make a less reliable labor productivity figure. Repairs are most often reported in terms of the names of vessels repaired, instead of man-hours required or other more definitive form. Input requirements are based upon US practice because of the lack of information on material quantities used in Poland.

APPENDIX E

SOURCES AND EVALUATION OF SOURCES

1. Evaluation of Sources.

The documents listed in the source list have been evaluated only as to the material extracted for inclusion in the report.

Most of the source material came from OO or CS documents published by CIA and from Intelligence Reports published by the Navy. Other US government agencies contributed some information, and foreign government reports were used.

Much of the information was of such a nature that many documents were required so as to form a logical pattern. Once a pattern could be established, it was possible to make some evaluation of the material contained within an individual document. In other cases it was necessary to rely on information which could not be fully evaluated. Very few documents contained detailed reliable information. Two of the best of this type contained information on the Six Year Plan and the vessel types being built.

2. Sources.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Probably true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which will carry the field evaluation "Documentary" instead of a numerical grade.

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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1. [redacted]
2. [redacted]
3. Navy, Translation 981, from Technica Morzia i Wybrezezo, Apr 1948. U. Eval. RR 3.
4. Ibid.
5. Navy, Comnavforger 267-51, Stettin, Oderwerke Shipyard, 26 May 1951 (info., Nov 1950). C. Eval. C-3.

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8. [redacted]
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10. CIA FDD, Special Translation 29, Polish Detailed Economic Plan for 1949, Part VIII, Employment and Labor Productivity, 17 Jul 1953. S. Eval. RR 3.
11. Navy, NA London, 44-S-52, Gdansk Shipbuilding and Ship Repair, 7 Feb 1952, (info., Oct 1951). S. Eval. B-2.

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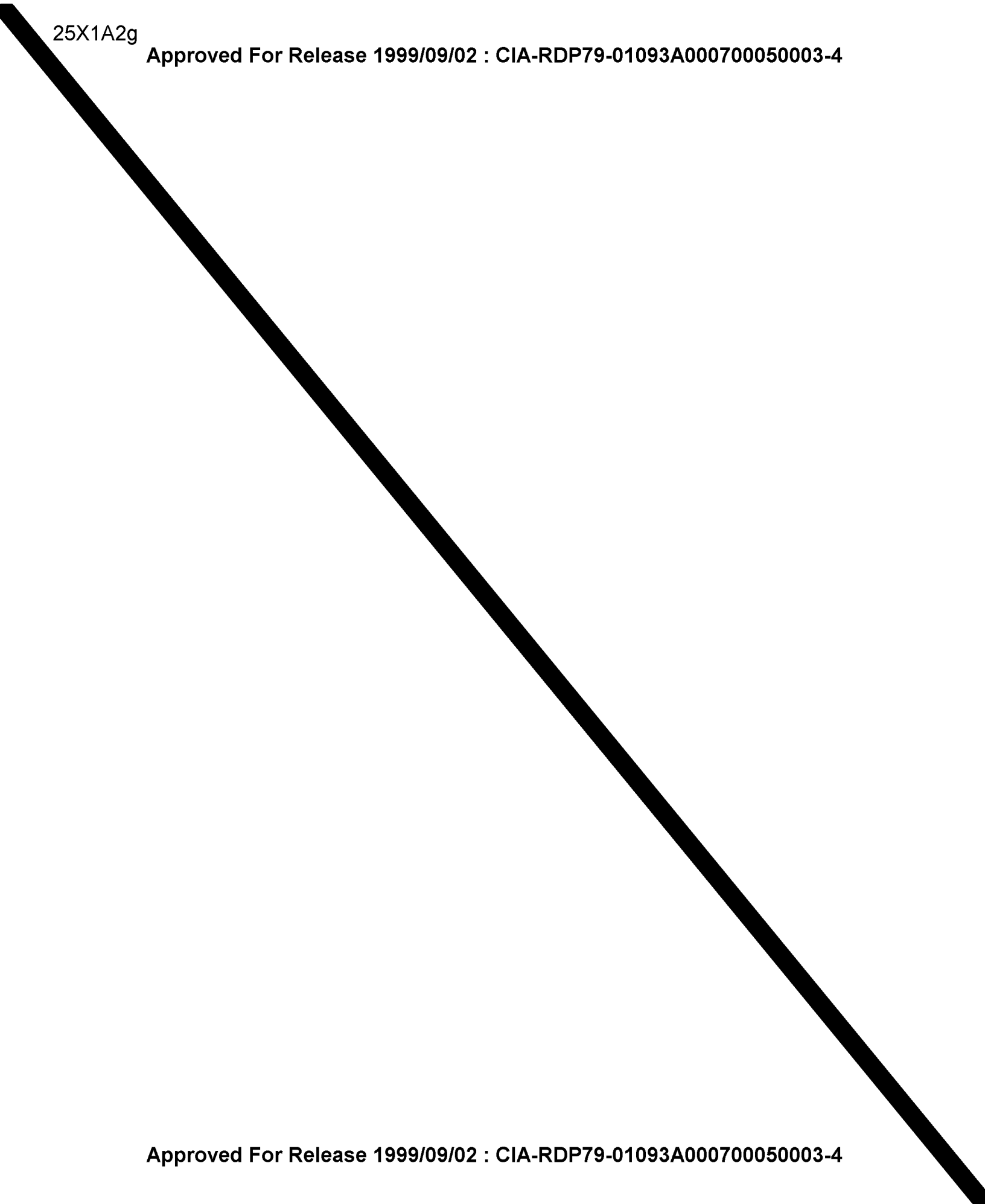
14. CIA FDD, Special Translation 29, op. cit.
15. NIS 14, Chapter III, Section 31, 31 Jul 1953. C.
War Production Board, Five Year History of Shipbuilding, Oct. 1945. U.



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